THERE is a curious error in Mr. Wallace's address which seems to deserve notice, as otherwise it will be often quoted without suspicion. He remarks (NATURE, vol. xiv. p. 407) :—

"It must also be remembered, as Mr. Moseley has suggested to me, that a flower which had acquired a brilliant colour to attract insects might, on transference to another country, and becoming so modified as to be capable of self-fertilisation, retain the coloured petals for an indefinite period. Such is probably the explanation of the *Pelargonium* of Kerguelen's Land, which forms masses of bright colour near the shore during the flowering season, while most of the other plants of the island have colourless flowers in accordance with the almost total absence of winged insects."

Now the difficulty is that there is no such *Pelargonium*[1] in Kerguelen's Land, though it is true that the insects are apterous. The flora of Kerguelen's Land is enumerated in the *Journal* of the Linnean Society, xiv. pp. 389, 390. Of such a persistence as that alluded to by Mr. Wallace there is an instance in the case of *Prinzlea*, of which Mr. Eaton detected some specimens with petals, though the coloration was, I believe very faint.

W. THISELTON DYER

Zittel's Palæontology

IN the review of Prof. Zittel's "Handbook of Palæontology," which appeared in NATURE, vol. xiv. p. 445, it should have been stated, in connection with the occurrence of Radiolaria in pre-Tertiary beds, that Mr. W. J. Sollas, of Cambridge, met with specimens in coprolites from the Upper Greensand, some three or four years ago, *vide Geol. Mag.*, 1873, vol. x. p. 272. Prof. Zittel duly records this fact in his paper on "Radiolaria from the North German Chalk," and mention of it was accidentally omitted in the concluding paragraphs of the review.

Newcastle-on-Tyne, September 25 HENRY B. BRADY

Visual Phenomena

IT is evident A. Mallock (vol. xiv. p. 351) and H. Airy (p. 392) describe two different, though allied, phenomena; the latter describes the appearance of rays of light, which, after entering the eye, meet at a focus, and diverge before reaching the retina; and the former, that of rays which reach the retina before meeting at a focus. For convenience, I shall call these respectively the "over-refracted radiance" and the "under-refracted." They differ in the following particulars in the case of my own eyes :—

The Over-Refracted Radiance	*The Under-Refracted Radiance*
(1) is diminished	is increased
by concave spectacles.	
(2) is increased	is diminished
by convex spectacles.	
(3) any given part may be cut off by advancing an opaque body in front of the pupil from the	
same side as	opposite side to
the given part	of the radiance.
(4) is green outside (or blue, if sunlight is used).	is red outside.
(5) consists chiefly of a more or less perfect ring surrounding indefinite rays. When the radiance is very large the rays disappear in the general brightness.	consists chiefly (when small, entirely) of well-defined rays, mostly forked.
(6) is not materially increased by increasing the size of the pupil; unless the radiance is very large, and even then it is increased much less than in proportion to the pupil.	is increased proportionately, or more than proportionately, to the size of the pupil.

The first four of these must evidently, from the theory of the mode of production of the two kinds of radiance, be constant for all eyes; but not knowing the cause of the last two, I cannot say whether *they* are so, or whether they are peculiar to some eyes. From H. Airy's notes, 4 and 6, it would appear that the latter is the case; for he is evidently short-sighted.

Though contracting my pupil to its smallest size has little effect in reducing the over-refracted radiance, yet by placing still smaller diaphragms in front, I can reduce it almost to a point.

With my naked eye I see both kinds of radiance; No. 3 of the above differences supplying an easy means of separating them, viz., by covering half the pupil. All then that lies on the same side as the exposed part of the pupil, belongs to the over-refracted radiance; and that on the other side to the under-refracted. But as I am rather short-sighted, the over-refracted radiance (which makes a nearly octagonal corona) greatly preponderates; so that I was not previously aware that the other existed with my naked eye. The application of the weakest spectacles (convex or concave) completely abolishes one or the other.

A. Mallock is hardly correct in calling his "phenomenon A" a *limiting* form; he is probably what is often called "long-sighted"—I do not know whether there is any proper name for this peculiarity of vision—for the limiting form of both kinds of radiance is a point. This is what I. W. Ward sees (see p. 423), his eyes being neither too refractive nor too little refractive, but just right (he uses the word "long-sighted" in a different sense from what I have). As most people are either long or short-sighted, they see one or the other kind of radiance with the naked eye; but it also appears from my own case that a person may see both kinds together, and such cannot see a point of light free from radiance, no matter what spectacles he uses, unless he uses a diaphragm. I should be interested in hearing whether, when I. W. Ward looks through spectacles, the rays appear.

The brightness of the point scarcely affects the size of either kind of radiance; but a red glass between the eye and it cuts off the outer edge of the over-refracted radiance.

Unlike H. Airy, I have failed to discern any relation between the positions of the beams of the over-refracted and under-refracted radiances, except that I suspect that the *beams* in the one may in some degree correspond to the opposite *gaps* in the other.

It would appear from the foregoing description of the phenomena in question more probable that the "wedge-shaped" portions of the crystalline lens, alluded to by H. Airy, instead of having the least refractive power, as he suggests, really have the greatest. The question arises, do different eyes differ in this respect?

THOS. WM. BACKHOUSE

Sunderland, September 19

Antedated Books

THE writers who have called attention to this point in NATURE will have rendered an important service to students if they obtain an amendment in the lax system often followed in this country. But it is to be hoped that the reform may be made complete. It is perfectly easy to have the exact date of issue and the number and letters of the sheets contained in the part stamped on the wrapper or cover, and then by binding these wrappers with the parts, an exact reference to the date is always at hand. This is done with praiseworthy exactness by some of the foreign societies. For instance, I receive this morning a part of the *Annales de la Soc. Entomologique Belgique*, the wrapper of which bears "Tome dixneuvième, fasc. i., signatures 1 à 13 et *a* à *f*. Paru le 16 Septembre, 1876." This it will be seen leaves nothing to be desired. Even in Spain, which we flatter ourselves is so far behind us, they manage this point accurately. The *Annales de la Soc. Esp. de Hist. Nat.* bears on the wrapper of each cuaderno the exact day of publication. Now that attention has been called to this point, let us hope that each society will instruct its secretary or editor, to see that the exact day of publication, and a summary of its contents, be stamped on the wrapper of every part issued.

Thornhill, September 19 D. SHARP

OUR ASTRONOMICAL COLUMN

THE BINARY STAR ξ BOOTIS.—A satisfactory orbit for this fine star is still wanting. Elements founded upon measures to 1833 were calculated by Sir John Herschel (period 117 years); and an orbit, on an extension of measures to 1854, was given by Hind (period 169 years), but later observation has shown them to be inadmissible. The great difficulty encountered in this case undoubtedly arises from the errors which must exist in one or more of Sir W. Herschel's angles, as was pointed out by his son in the *Memoirs of the Royal Astronomical Society*, vol. vi.,

[1] There is a *Pelargonium* in Tristan d'Acunha (see Moseley, in *Journ. Linn. Soc.* xiv. p. 383.)

and in any further investigation the first step must be to ascertain under what interpretation these can best be reconciled with subsequent measures, it being evident that all cannot be accepted as registered. Sir John Herschel considered the angles of 1792 and 1795, especially the former, must be affected with considerable error. These angles are respectively 355°·74 and 354°·9, or by a mean 355°·3 for 1793·76, but if we suppose that they should have been registered in the north-following quadrant, instead of the north-preceding one, the mean would become 4°·7, an angle in much better accordance with the progression shown by the observations of 1782, 1802, 1804, and those of Struve, Herschel, and South about 1821. It might be worth while to determine how far this alteration would lead to a more admissible orbit. At the same time we have to bear in mind Sir W. Herschel's remarks with respect to his observation, 1792, April 20, in *Phil. Trans.*, 1804, p. 367. And equally are we to take into consideration for our guidance the same observer's estimations of distance in 1782 and 1804.

DIAMETER OF VESTA.—At the opposition of 1855, this brightest of the minor-planet group, which during the last spring, as in previous favourable oppositions, was discernible with the naked eye, was observed by Prof. Secchi to present a diameter but little inferior to that of the first satellite of Jupiter, "ma molto più debole di luce, e di colore ranciato carico," and he estimated it at o″·8 ; this we find corresponds to a true diameter of 450 miles. The least distance of the planet from the earth in 1855 was 1·26.

PIGOTT'S COMET OF 1783.—On the night of November 19, 1783, a comet was discovered by our countryman, Pigott, at York, well known as having also detected the remarkable variable stars, R Coronæ Borealis, R Scuti, and η Aquilæ. Pigott notified his discovery to Mechain, who observed the comet at Paris on the 26th of the same month, and, in conjunction with Messier, determined its positions until December 21. It was at no time visible without the telescope. Elements were calculated by Mechain and Saron, though without satisfactory results on a parabolic hypothesis. Subsequently Burckhardt investigated the orbit without this assumption, and finally arrived at elliptical elements, with a period of revolution of 5·61 years. But the most precise determination of the orbit from the Paris observations has been made by Prof. Peters, of Clinton, U.S., who reduced the observations anew, and introducing Hansen's Tables for the earth's positions, found elements which "represent the whole series to satisfaction." These elements are published in the "Astronomical Notices" issued by Prof. Brünnow, while in direction of the Observatory at Ann Arbor, Michigan (No. 19), but as this periodical is comparatively little known in this country, having been continued for a short time only, we transcribe the orbit here :—

Perihelion Passage, 1783, Nov. 19·93685 M.T. at Paris.

Longitude of perihelion	50	17	25·4	}	M.Eq. 1783·0
" ascending node ...	55	40	30·5		
Inclination	45	6	53·8		
Angle of eccentricity	33	32	8·4		
Log. semi-axis major	0·5133056				
Period of revolution	5·888 years.				

In this orbit the perihelion distance is 1·4593, and the aphelion distance 5·062.

The comet has not been found since 1783. As remarked by Prof. Peters, a major-axis differing but little from the above would have sufficed to bring the comet into close proximity to the planet Jupiter, at one or other of the subsequent aphelion passages, whence it is possible great perturbations may have resulted, even of magnitude sufficient to effect an entire change of orbit. Indeed with the above elements we find the distance of the comet when in aphelion, from the orbit of Jupiter, is only 0·42. Independently of this, there is another cause which might have long operated to prevent the re-discovery of the comet: in 1783 it appeared under nearly the most favourable circumstances possible for observation, yet as before stated it was at no time visible to the naked eye, and while approaching pretty near the earth, did not exceed 8′ in diameter, presenting throughout the appearance of the great majority of telescopic comets.

The orbit of Pigott's comet passes very near to that of the planet Mars : in heliocentric longitude 55°·2, we find the distance is only 0·032, and it is to be remarked that this close approach takes place in one of the regions where the orbit of the lost comet of De Vico also comes into such near proximity to that of the planet ; still after M. Leverrier's statement with reference to past perturbation of De Vico's comet by Mars, we are not to suppose that the bodies can be probably identical.

With respect to the introduction of Pigott's comet into our system, small variation in the major-axis assigned by Prof. Peters would have caused a very close approach of the comet to Jupiter at the aphelion passage immediately preceding the comet's appearance, or early in 1781.

THE SELF-FERTILISATION OF PLANTS

MR. THOMAS MEEHAN, one of the most acute and thoughtful of American botanists, has several times during the present year brought before the Philadelphia Academy of Natural Sciences the subject of the fertilisation of plants. He has observed that there are plants with conspicuous and attractive flowers, which are as much adapted to secure self-fertilisation as other flowers are for cross-fertilisation. One of his examples is the green-house annual, *Browallia elata*, belonging to the order Scrophulariaceæ, having an attractive blue flower. Not only does it produce abundance of perfect seeds without insect aid, but also the entrance of an insect would ensure self-fertilisation. The style is nearly as long as the corolla-tube, and the slightly longer stamens are arranged closely around it. Two of the anthers are inverted over the stigma, and their connective is densely bearded, appearing like petaloid processes, completely closing the tube of the corolla. No insect can thrust its proboscis into the tube except through this mass ; and if it has foreign pollen adherent to it, it will be cleaned off by the beard. Furthermore, the very act of penetration will thrust the anthers forward on to the pistil, and aid in rupturing the pollen sacs, and securing self-fertilisation.

Another phenomenon, the "sleep" of plants, or closing of the flowers at nightfall, has been found by Mr. Meehan to have reference to self-fertilisation in *Claytonia virginica* (order Portulacaceæ) and some buttercups, which seed abundantly, without being visited by insects. In Claytonia, the stamens, on expanding, fall back on the petals expanded during daylight. At night, when the flower closes, the petals carry the anthers into close contact with the stigmas, and actual fertilisation only occurs in this way. In many cases, the stamens recurve so much as to be considerably doubled up by the nocturnal motion of the petals ; thus the anthers are not brought into contact with the stigmas, and the flowers are barren.

In *Ranunculus bulbosus*, in the evening following the first day's expansion of the flower, Mr. Meehan has found the *immature* anthers and the young stigmas covered with pollen-grains. This would naturally be supposed to be the consequence of insect visits ; but no insect visits had taken place in the cases examined. However, on carefully studying the flower it was found that coincidently with its expansion, a single outer series of stamens shed their pollen into the petals, from which it easily fell to the immature anthers and the stigmas when the flower closed for the night. Another equally remark-